




Thallium Bromo-Chloride


KRS-6


◆ Key Properties of KRS-6 (Thallium Bromo-Chloride, TlBrCl)


 Broad Infrared Transmission: Transparent from $\sim 0.4 \mu\text{m}$ to $25 \mu\text{m}$, ideal for visible, MWIR, and LWIR optical systems.


 Non-Hygroscopic: Moisture-resistant and chemically stable — far more durable than NaCl, KBr, and other hygroscopic IR salts.

 Moderate Refractive Index: ~ 2.25 – 2.30 in the infrared, suitable for broadband long-wavelength imaging and sensing.


 Mechanically Compliant: Exhibits flexibility and low internal stress, making it useful for ATR elements and spectroscopy components.


 Low Dispersion: Stable refractive index across a wide spectral band, supporting accurate FTIR and broadband measurement.


 Chemically Compatible: Resistant to laboratory atmospheres and less prone to surface degradation than typical IR halide materials.


 Wide Operating Range: Performs reliably under moderate temperature cycling in analytical and thermal systems.


Applications of KRS-6 (Thallium Bromo-Chloride)


 FTIR Spectroscopy: Commonly used for windows, beamsplitters, and optical components in mid-IR and far-IR spectrometers thanks to its wide 0.4–25 μm transmission range.

 ATR Crystals: Its mechanical flexibility and non-hygroscopic behaviour make KRS-6 ideal for ATR elements used in chemical, biological, and polymer analysis.

 Thermal Imaging & IR Detection: Performs reliably in mid-IR assemblies that require stable transmission and resistance to moisture and environmental exposure.

 Environmental & Gas Analysis: Suitable for instruments measuring long-wave IR absorption features in atmospheric monitoring and analytical gas-cell systems.

 Broadband IR Windows: A trusted material for optical windows requiring smooth, wide spectral performance across the visible-to-far-IR.

 Laboratory & Industrial IR Equipment: Offers long-term stability in spectroscopy, process-monitoring, and diagnostics thanks to its chemical resistance and non-hygroscopic nature.

Technical Parameters of KRS-6 (Thallium Bromo-Chloride, TlBrCl)

Property	Typical Value
Transmission Range	0.4 μm – 25 μm
Refractive Index	~2.1 @ 10 μm
Density	~6.0 g/cm ³
Melting Point	~425 °C
Hardness	Soft, flexible
Thermal Expansion	~40 $\times 10^{-6}$ /°C
Crystal Type	Polycrystalline (pressed)
Hygroscopic	No
Chemical Formula	TlBrCl
Applications	FTIR windows, ATR crystals, gas analysis, long-IR optics

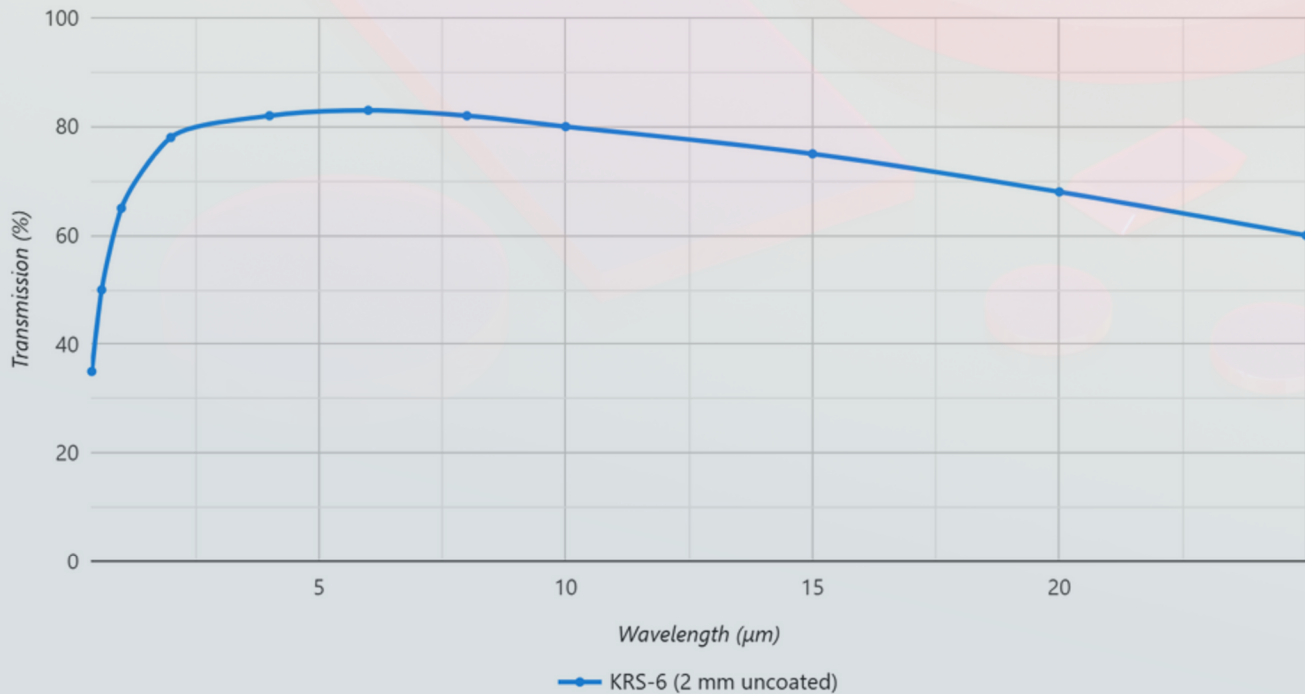
KRS-6 (Thallium Bromochloride) is a durable infrared optical material with broad transmission from 0.4–25 μm , making it well suited for FTIR spectroscopy, thermal imaging, and gas analysis.

It has a moderate refractive index (~2.25 in the mid-IR), low dispersion, and is non-hygroscopic, offering better stability than hygroscopic salts like KBr or NaCl.

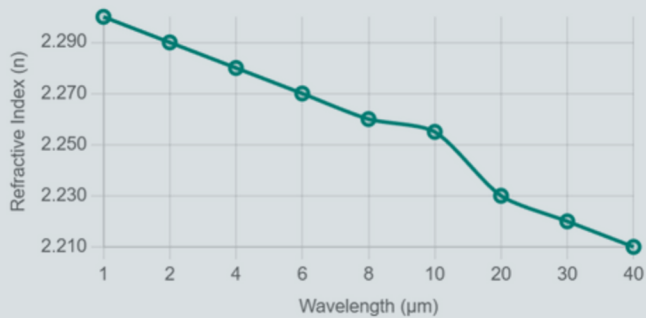
KRS-6 is also mechanically soft and workable, allowing it to be shaped into windows, prisms, and ATR components while maintaining reliable performance across long-wavelength IR applications.

KRS-6 (Thallium Bromochloride) Transmission Graph

KRS-6 Transmission vs. Wavelength (Uncoated)



Refractive Index of KRS-6 vs. Wavelength

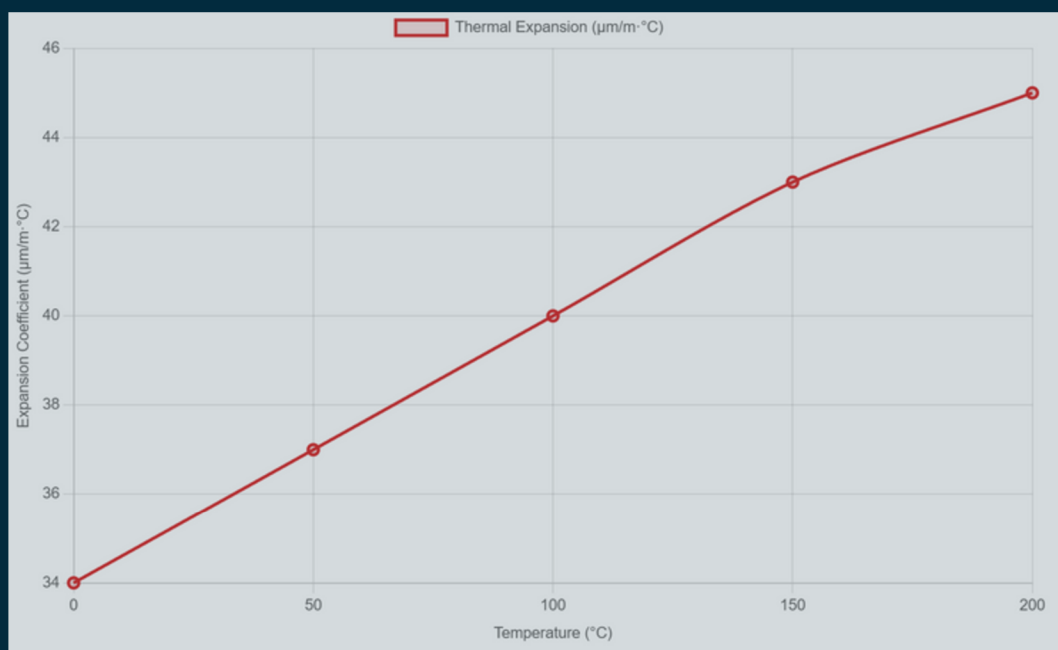


Wavelength (μm)	Refractive Index (n)
1	2.3
2	2.29
4	2.28
6	2.27
8	2.26
10	2.255
20	2.23
30	2.22
40	2.21

KRS-6 offers broad infrared transmission from $\sim 0.4 \mu\text{m}$ to $25 \mu\text{m}$, providing strong performance across the visible, mid-IR, and far-IR regions. With a moderate refractive index (~ 2.25 in the mid-IR) and low dispersion, it is well suited for FTIR optics, gas-analysis cells, ATR components, and broadband IR windows.

Thermally, KRS-6 shows a stable expansion coefficient and maintains good dimensional stability under normal laboratory conditions. Although mechanically soft, it processes easily into windows, prisms, and IR elements with consistent optical uniformity.

Because it contains thallium, KRS-6 requires careful handling, but it remains non-hygroscopic and chemically stable, making it a reliable material for long-wavelength infrared applications.



FAQ

Q: What is KRS-6 used for?

A: KRS-6 is widely used in mid-infrared and far-infrared optical systems due to its broad transmission range from $\sim 0.4 \mu\text{m}$ to $25 \mu\text{m}$. It is commonly used for windows, beamsplitters, IR sensing optics, environmental monitoring instruments, and spectroscopy systems that require stable, non-hygroscopic materials.

Q: What makes KRS-6 different from KRS-5?

A: KRS-6 (TlBr/TlCl) and KRS-5 (TlBr/TlI) are similar IR halides, but KRS-6 offers slightly lower refractive index, improved mechanical stability, and better environmental robustness. It is also less malleable than KRS-5, giving it improved durability for optical windows and long-term sealed systems.

Q: Is KRS-6 hygroscopic?

A: No. KRS-6 is non-hygroscopic, meaning it does not absorb moisture. This makes it more durable and easier to handle than IR salts like NaCl, KBr, or CsI, which degrade quickly in humid environments.

Q: What is the refractive index of KRS-6?

A: The refractive index is typically around $n \approx 2.2\text{--}2.3$ across the mid-IR, depending on wavelength. Its low dispersion makes KRS-6 suitable for broadband imaging and spectroscopy.

Q: What is the transmission range of KRS-6?

A: KRS-6 transmits efficiently from $0.4 \mu\text{m}$ to approximately $25 \mu\text{m}$, covering visible, mid-IR, and far-IR wavelengths. This wide spectral coverage makes it ideal for FTIR, gas analysis, and environmental sensing.

Q: How mechanically durable is KRS-6?

A: KRS-6 is softer than materials like germanium or sapphire, but it is more mechanically stable and less flexible than KRS-5. It withstands moderate pressure and temperature cycling and is suitable for mounted optical components.

Q: Is KRS-6 safe to use?

A: KRS-6 contains thallium compounds and should be handled with care, avoiding abrasion or ingestion of dust. In solid, polished optical form it is stable and safe to use when normal laboratory handling procedures are followed.

Q: Can KRS-6 be coated?

A: Yes. KRS-6 can be supplied with custom anti-reflective (AR) coatings to improve transmission in specific IR bands. Protective coatings may also be applied to increase surface hardness.